FIRST NATIONS MOLD REMEDIATION CASE STUDY

Ahousaht First Nation

To better assist First Nation communities in managing mold problems, Canada Mortgage and Housing Corporation (CMHC) has prepared a number of mold remediation and repair case studies drawing on the experiences of First Nation communities from across Canada. The case studies highlight current housing operations, key milestones, successes, decisions, changes and experiences of First Nations that have led to effective solutions to mold problems. The communities are diverse, and so, the case studies provide a variety of solutions based on each community's specific circumstances, needs and capacity to deal with the problems. Each case study includes a description of the community's approach to solving mold problems, implications for new housing, outcomes and lessons learned.

The case studies were prepared based on interviews with key members of the community, including housing department staff, councillors and mold remediation and repair contractors. First Nations seeking information on how other communities across Canada have dealt with mold may find the experiences recorded in the case studies to be useful in preparing mold remediation and prevention strategies for their own purposes.

THE COMMUNITY AND HOUSING OVERVIEW

The Ahousaht First Nation is situated on Flores Island, in the heart of Clayoquot Sound, off the west coast of Vancouver Island. Flores Island is quite remote, reachable by float plane or, more commonly, by way of a 45-minute water taxi ride from Tofino—one of Canada's prime tourist destinations with over a million visitors annually (see figure 1).

The main economic activities in the Ahousaht community are tourism, aquaculture, forestry and fishing. Community members are employed seasonally in silviculture, water taxi transport, construction, tourism, forestry and aquaculture.

Figure 1 Ahousaht First Nation, British Columbia. View of community from the water taxi

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Fish farms have replaced the once vibrant fishing industry and have become the community's second largest employer— after the First Nation government itself.

Quick Facts

- The community area is 149 hectares (368 acres).
- There are 1,876 registered members
- Of the registered members, 900 live in the community.
- The population is expected to increase to 3,125 by 2024.
- Seventy-seven per cent of the members are under age 40.
- Forty-one per cent of the members are under age 19.
- There are approximately 150 houses.
- The annual rainfall is more than 3 metres (10 feet).

Source: AANDC, 2011.

In 2009, the media across the country told a hopeless story about an unhealthy community, living in mold-infested houses, plagued with social problems. The Ahousaht housing department struggles daily to keep water from invading the houses in the community. And it's no wonder— given that few houses are designed to withstand rainfall more than two times what Vancouver gets in a year. In addition to the heavy rainfall, the old town site, where the majority of the older houses are situated, is troubled by underground springs and poor drainage.

"We don't have a moisture problem, or a humidity problem, this community does not have issues with dampness," said Jerry Boyko, Ahousaht First Nation building project manager. "We have a water problem, plain and simple."

Jerry Boyko, 69, has over 50 years experience in construction, mostly as a self-employed construction contractor and project manager. He has designed and built every type of housing with budgets of up to $10,000,000 and hydroelectric power projects of up to $21,000,000.

With Boyko's help, the community began to tackle its mold issues in 2009, and what was once an impossible problem has been turned into an opportunity. Mold remediation has given the community reason to rethink housing in general—coming up with new approaches, new thinking and new funding. The community may just be at the beginning stages in the process, but it has already put many changes in place that are making a difference and have people thinking about what they can do for themselves in their houses rather than what they can expect from the First Nation.

MOLD ISSUES

Most of the houses in Ahousaht were built with Aboriginal Affairs and Northern Development Canada (AANDC) grants in the 1960s and 1970s, the majority having been built on vented crawl spaces with little thought given to proper drainage. The remaining houses were built between 1990 and 2004 with a combination of funding from the First Nation, AANDC and CMHC.

Overcrowding, substandard building practices, poor workmanship, inadequate or no drainage systems, no formal process for building code inspections, low-cost moisture susceptible building materials and the harsh, wet, west coast weather are some of the factors that have caused the accelerated deterioration of the houses, high moisture problems and mold (see figures 2 and 3).

With inadequate budgets, resulting in part from the high cost of barging materials to the island, and the lack of management capacity, the First Nation slipped further and further behind in its goal to manage its mold

problems, which affected almost 70 per cent of the homes in the community. "Our basements and crawl spaces were wet; our walls and windows and roofs were wet or leaking," said Boyko. "Our houses were failing in pretty much every way."

Figure 2 The interior wall shows moisture damage originating in the porch attachment, shown below in figure 3

Figure 3 Porch attachment. View from outside

COMMUNITY'S APPROACH TO SOLVING MOLD PROBLEMS

Home occupant discontent, triggered by health concerns, led the community's leadership to seek the funding needed to deal with the problems. After negotiations with private lending institutions, AANDC and CMHC, the First Nation worked out a financial plan that was used to launch a mold remediation project that started in 2009. Ahousaht's first step was to hire Jerry Boyko as project manager. Boyko, a former building contractor with a proven track record in renovation and remediation has been responsible for every aspect of the project, from analyzing the housing needs to preparing the final reports. Boyko assisted the First Nation in making sense of the mountain of studies that had piled up in the offices for more than a decade. "Mostly," he said, "we put the studies aside and formed a team made up of Ahousaht people who knew what the community needed. From there, we just got started."

The First Nation began by building a new housing team. The Housing Committee was strengthened and was given the authority to make day-to-day decisions. The Housing Committee members forged good working relationships with leadership, the new project manager and the Housing Department. From there on, the housing team proceeded on many fronts. The mold problem was so widespread they had to decide where to start. Initially, the team established a scope of work for each house, and a priority list was created. New construction policies and practices were put in place. Because Ahousaht is isolated, bringing in professional contractors has always been difficult and expensive and so the training of local people and building capacity in the community was needed to complete the work.

Ahousaht became a learning community. Not only were trainers brought in, but also the housing crew and staff were sent out to take all the training they could get. The local crew took Workplace Hazardous Materials Information System (WHMIS) and WorkSafeBC (Workers' Compensation Board of B.C.) training.

CMHC trainers delivered a variety of training workshops including the Builder Series, Indoor Air Quality Investigator, Introduction to Ventilation Systems, Basic Home Maintenance and Let's Clear the Air. The training also included airtightness testing of the buildings in the community. The crew also learned how to execute better construction practices and detailing through the use of a blower door.

CMHC's capacity development team also worked with the maintenance crew members to get them trained and qualified to do their own mold assessments and remediation work. Additionally, with the knowledge and skill the community's maintenance crew members soon developed, they were able to replace the hazardous material remediation professionals brought in from outside the community. This saved the First Nation thousands of dollars and resulted in the creation of local jobs. Of the original six trainees, four are still working on the local building/maintenance crew and continue to upgrade their skills. One of the members has become qualified as a trainer for several CMHC Aboriginal housing and indoor air quality workshops.

Training also took place with factory specialists. The crew learned to install heat recovery ventilators (HRVs) and energy recovery ventilators (ERVs) and mini-split heat pumps. This qualified the community to receive distributor pricing, which in turn allowed them to supply and install the products more broadly in the community. This created jobs and skills, as well as generated further savings.

By 2010, two large projects were well under way—a new subdivision with the capacity for 90 new houses and mold renovations for 50 of the worst contaminated houses.

WHAT THIS MEANT FOR NEW HOUSING

New building practices for new construction

Once the plans were completed, work got under way on a new subdivision, including a network of paved roads complete with an integrated stormwater management system.

The island's old quarry was put back into service to generate stone and granular fill to build roads, driveways and gravel pads used to create well-drained home sites. With the help of a crusher and screening plant, various granular fill materials were created, ranging from 19 mm (0.75 in.) to 15 cm (6 in.). Once servicing of the lots was completed, gravel pads were placed to a depth of 1 metre (3 feet)—raising each house away from the water table and creating a significant drainage layer (see figures 4 and 5).

Figure 4 New house on gravel pad to drain water away from the house

Figure 5 New subdivision showing roads, street lights, services and gravel pads

To ensure that new constructions would meet the National Building Code, the Chief and Council passed a motion to make code compliance mandatory. In addition, the Housing Committee and leadership approved a set of supplementary construction policies, designed to prevent moisture and mold in their new homes. These measures included:

- the use of insulated concrete forms (ICFs) to build well-insulated, conditioned (that is, heated) crawl spaces, with a concrete slab placed on the granular pads;
- the incorporation of a rainscreen into the siding installation, with proper flashing details around the windows, doors and all service entries passing through the building envelope to protect against rain penetration;
- the use of plywood sheathing and two layers of tar paper to replace oriented strand board (OSB) and housewrap which, from Ahousaht's local experience, were unsuccessful at withstanding the extreme wet and weather conditions;
- the installation of ENERGY STAR® rated vinyl windows, for energy efficiency and condensation resistance, and moisture-resistant frames;
- the use of high-efficiency mini-split heat pumps to heat, cool and dehumidify the homes at a fraction of the cost of fully ducted heat pump systems;
- the installation of ERVs in all new homes to provide continuous ventilation and simultaneously exhaust stale air, manage moisture and introduce fresh air into the homes;
- the use of range hoods and bathroom fans to ensure moisture and odours exhaust outdoors;
- the use of water-durable floor coverings on kitchen and bathroom floors, as well as treated, water-resistant drywall in the bathrooms; and
- the use of a new type of electrical panel that is especially designed to accommodate a backup generator in case of a power outage (common in the area).

Currently, the community purchases modular housing units that are trucked in from Vancouver to provide for quick assembly. This allows the building crew to quickly and easily close in the houses, making them less susceptible to the moisture damage that may occur during a longer site construction period. These modules provide the rough frame only and are finished on site, inside and outside.

The ICF walls and the concrete slab ensure that crawl spaces are dry and warm (see figure 6). Concrete was provided by means of a small batch plant located in one corner of the subdivision (see figure 7).

Figure 6 ICF crawl space on concrete slab provides a dry and warm space

Figure 7 On-site concrete plant to service the construction of the new subdivision

In addition, with the installation of the mini-split heat pumps, these new homes now heat for a fraction of the cost of using electric baseboards. It is worth noting that the mini-split heat pumps also have the ability to function as dehumidifiers to ensure that appropriate moisture levels are maintained in the homes—this is especially important in a mild, wet climate like that found on the west coast. That said, electric baseboard heaters are still used but only to provide backup heat and even out the temperatures in the bedrooms that the mini-splits do not directly serve (see figure 8).

Figure 8 Mini-split heat pump—the view out the window shows the outdoor compressor unit on the adjacent house

Because of limitations with available power, only 14 new houses are built per year. If this number is repeated in coming years there will be a steady and predictable number of new homes in the community. The new houses look and perform differently than anything ever built in the community, as evidenced by a new eight-unit complex (see figure 9). An early indication of the building's performance success is demonstrated by the evidence of moisture problem-free homes. This was accomplished through newly adopted design features; ventilation and air movement combined with a drainage system that sheds water away from the house. It is obvious just driving around the subdivision that something new is happening in housing (see figure 10).

Figure 9 Newly built eight-unit complex showing new design options

Figure 10 Newly constructed house showing new building practices

NEW APPROACH TO RENOVATIONS

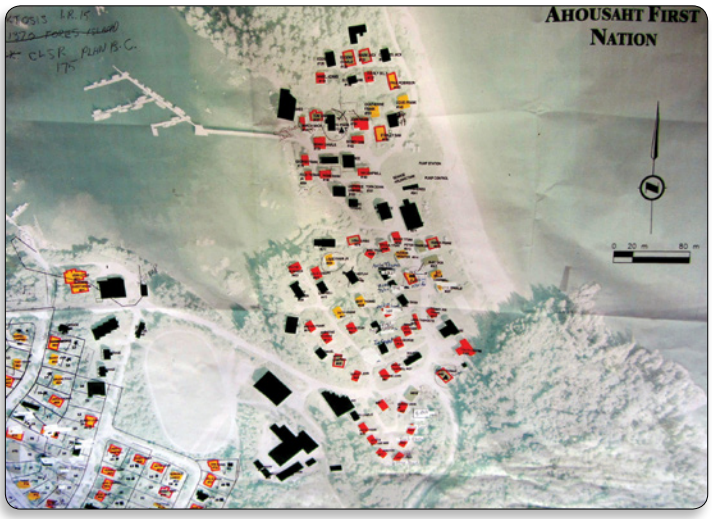
The building project manager, in unison with the housing manager, the construction foreman and the Housing Committee, also applied the new construction policies and techniques to renovations.

"Building the new places and applying the new building practices really showed us what we needed to do when we began renovating. We got to see what a new place should look like when it was built right—that was really helpful," said Luke Swan, the community's housing maintenance manager. They started thinking about moisture and airflow differently and began asking questions about how to keep water out of the buildings.

In these houses, Swan explained: "we are now concentrating on good ventilation, circulation of air in the homes and exhausting the stale air."

To better understand the challenges facing the community, the Housing Department, with assistance from the Health Canada environmental health officer (EHO), created a colour-coded map of the community, which was used to create a priority list for mold renovations (see figure 11).

Figure 11 Colour-coded map of the community, showing the priorities for mold renovations based on occupants' health concerns and amount of mold in the home



Priority was based on the occupants' health concerns and the amount of mold in the home. A maximum of $65,000 was budgeted for repairs and mold remediation.

With the help of CMHC and its training programs, the Ahousaht building crew became mold investigators—no longer requiring outside technical support, which, until that point, had been consuming much of the funding provided by AANDC to complete the mold remediation.

The new renovation practices included:

- the clean-up of small mold areas, focusing on window sills;
- the replacement of all deteriorated materials with medium and large areas of mold;
- the use of mini-split heat pumps to supplement existing baseboard heaters;
- the use of water-durable floor coverings on kitchen and bathroom floors, as well as treated, water-resistant drywall in the bathrooms;
- the installation of 1.2 m (4 ft) overhangs over all exterior door entries;
- the replacement of metal windows with vinyl windows in existing buildings for improved condensation resistance and energy efficiency;
- the installation of new siding, complete with vented rainscreens, including new detailing around all windows, doors and other penetrations to prevent rain infiltration;
- the replacement of OSB sheathing with plywood to encourage drying and improved moisture control;
- the replacement of housewrap with two layers of tar-impregnated building paper to provide a better weather barrier;
- the replacement of bathtubs with one-piece tub enclosures for durability and ease of maintenance (and removal of windows above the tub), making walls behind tubs less susceptible to leaks, moisture damage and mold growth;
- the replacement and redesign of the metal components for the building—flashings, eavestroughs and downspouts— to better manage rainwater; and
- the creation of ICF conditioned crawl spaces (enhanced insulation and airtightness) and a concrete slab to better manage wet soils and moisture conditions within these spaces.

However, there is still a need to recognize site grading as an important part of water management, in and around older houses, especially those with nearby springs.

"Our old houses had no ventilation or air circulation. In the crawl spaces, we had sand on top of poly, but the sand was always wet and there was no air flow," Swan said. "After I took the training, I realized that we had

to think about creating air movement. We had electric baseboard heat with no ventilation and no circulation. The mold situation wouldn't be anything near what it is today if there had been air movement."

OUTCOMES AND LESSONS LEARNED

The Ahousaht First Nation has started or completed 19 new homes and completed 17 renovations since 2010. The community now has a well-trained renovation and maintenance crew and has been able to retain a high percentage of the trained personnel.

There is evidence, in both the new homes and the renovated older homes, that the new building practices will enable the structures to withstand the onslaught of water. Boyko said, "Don't believe it when people say water runs downhill all the time. With our wind and rains, it runs uphill in Ahousaht, and we have to build with that in mind."

Most importantly, the community has adopted a learning approach to housing. "We are constantly applying new and improved building techniques," Swan said. "We keep learning, with each house it gets better because we take the time to sort out what is working and what needs to be improved."

MANAGEMENT AND LEADERSHIP

Ahousaht's new approach was not limited to the builders. Management and leadership were strongly in support of the changes underway in their community. The large construction project attracted new and enthusiastic members to the Housing Committee. Four councillors became non-voting members of the Committee, which resulted in a direct line of communication with leadership. Boyko said, "We never have to worry about miscommunication with the Council. We have councillors right here on the Housing Committee. The leadership has been fantastic."

In spite of training and leadership support, the housing manager's position has a high turnover rate. The housing manager oversees project coordination, communications, tenant relations and administrative tasks, in conjunction with the finance and social development departments. While the new housing policies have resulted in fewer maintenance requests, it still remains a challenging job. The trend of increased home occupant participation, holds the promise of further easing the burden on the housing manager's position.

As the work unfolded on the renovations, the housing team discovered far more problems than those previously outlined in the original scope of work, at times requiring the complete replacement of outside walls. As a consequence, budgets were often insufficient, and this, combined with the additional work, forced families to remain in the three transition houses that the band had purchased to house families during renovations and construction longer. Management and leadership continue to look for more innovative ways to fund the work and are forging relationships between willing lenders and those band members who are prepared to take out housing loans.

HOUSEHOLDS

The Housing Department is finding new ways to collaborate with the residents of new homes and rental homes. The Department manages the funds, budgets, grants and financing mechanisms for new construction. The house occupants choose their own housing designs and hire their own contractors to finish the houses, once the modules have been put in place. So far, Ahousaht members are doing most of the finish work. Currently, there are 19 new houses completed or under way, and all the home occupants are taking an active part in their building.

The housing team encourages potential homeowners to do their own labour as a means to build equity in their new house (sweat equity). People are beginning to realize that sweat equity will save them money, as it expands what can be built. "The more people do themselves, the more house they get. We have a husband and wife right now who are working late at night helping to build their house," Boyko said.

The Housing Department has conducted several home maintenance workshops for house owners and tenants. They have held, and plan to hold more, housing meetings and education sessions for membership dealing with topics such as policy implementation, the effects of moisture on houses and personal budgeting. The Housing Department is planning to work with lending institutions to co-facilitate workshops aimed at getting people ready for mortgages to build their own new home or buy their existing home. The project has already raised awareness in the community about how much housing costs and how important it is for personal budgets to be in place in order to qualify for housing loans.

The fact that people have been working on their own homes has resulted in less frustration and fewer maintenance requests from tenants to the Housing Department. These are indications that Ahousaht's new homeowners and the home occupants in renovated homes have taken a new approach to taking care of their houses. The idea that the house is theirs has driven many to take an active role in maintaining their homes. "It's still hard though," Swan said. "You can never satisfy everyone. There are so many houses that need renovating; we just can't get to them all. We are waiting now for more funding to go through. It's frustrating having to wait."

The community is rebuilding relationships with lending institutions, government and internal departments. But, most importantly, Boyko said, "We are changing attitudes in the community. The people are beginning to realize that they can do something themselves with their houses. The home occupants in the new subdivision are leading the way through the example of sweat equity."

LOOKING FORWARD

Given that the old village was built without thought to proper grading or drainage around the homes and the fact that the houses are only metres away from one another, finding fill materials and creating an adequate slope around the existing houses has proven difficult. The old road base was built up, but without the use of culverts or any means to drain water under the roads, there are some water management issues. The drainage techniques used in the new subdivision have yet to be applied to the old village. So far, the housing team has identified the problems but has no immediate action in place to deal with springs, water table and drainage problems.

The housing department is hoping to build a warehouse in order to stockpile building materials, as well as have someone to manage it. The access to building materials has always been a problem; barging materials to the island takes time and is expensive. In addition, the warehouse would serve for the storage of construction tools and equipment.

Additional funds are still needed if Ahousaht is to continue its mold renovation projects. The First Nation intends for those funds to come from the home occupants themselves. The community and lending institutions are continuing to work together on the development of a loan program for home occupants to access funds to renovate and purchase existing homes from the First Nation.

LESSONS LEARNED

The Ahousaht mold remediation and new building projects have been important learning opportunities for the community. The most important lesson learned is that "we still have a lot more to learn, and many of our building practices still need improvement," Swan said. But, when each house they build or renovate is better than the one before, the results bring a lot of satisfaction and encourage the Ahousaht First Nation to carry on.

CONCLUSION

The key to success in Ahousaht started with motivated leadership keen on making and supporting change. The First Nation took control of its housing. The Housing Committee was reinvigorated and a key person was hired to manage the change—someone who was able to inspire a team to work together. Leadership, management, staff and home occupants all decided to make learning a priority. They worked closely with CMHC and others to get training that suited their needs and have been able to build and retain capacity in the community.

The Housing Department set long- and short-term goals and has acquired a sense of accomplishment—this drives the team on. The development of positive relationships has been a key aspect for success as well—relationships with government, financial institutions, regional groups such as the Clayoquot Forest Communities Program, suppliers and leadership, as well as between team members. The Housing Department actively pursues funding and financing opportunities to maximize the scope of the housing project. And, most of all, as Boyko said, "We can't do it all at once, or satisfy everyone, but we are making some really positive headway."

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